

Concord Evaluation Group

Invent It. Build It. 2017: Evaluation Report

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Contact

For questions or more information about the *evaluation study*, please contact:

Christine Andrews Paulsen, Ph.D.
President
Concord Evaluation Group
PO Box 1205
Concord, MA 01742
(978) 369-3519
cpaulsen@concordevaluation.com

For questions about the *Invent It. Build It.* event, please contact:

Randy Freedman, M. Ed
Director of Student Programs
Society of Women Engineers
130 E Randolph Street, Suite 3500
Chicago, IL 60601
(312) 596-5232
randy.freedman@sweoffice.org

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Executive Summary

Background

The Society of Women Engineers (SWE) with funding from the ExxonMobil Foundation and in partnership with Girls Scouts of the USA, WGBH's Design Squad and Techbridge held the eighth annual *Invent It. Build It. (IIBI)*. The event took place at the SWE annual conference in Austin, TX. Participants included 307 middle school girls, 133 high school girls, plus 184 of their parents/guardians and educators.

In addition, 427 SWE members volunteered at the event to facilitate the activities, act as role models, and work closely with the middle school and high school girls throughout the day. Forty-three exhibitors provided information about camps, competitions, and resources as part of the *Invent It. Build It. EXPO*.

Concord Evaluation Group was hired to conduct an independent evaluation of the event. This report summarizes the evaluation findings.

The evaluation found strong evidence, as it has year after year, that SWE continues to achieve its goals for *Invent It. Build It.* Once again, the event...

- Changed girls' attitudes about engineering careers by exposing them to different ways of thinking about engineering.
- Engaged girls in two different hands-on engineering activities to build their self-confidence and critical thinking skills as they relate to engineering.
- Enabled girls, parents, and educators to meet and network with engineering role models.
- Helped girls draw connections between their career passions and engineering by sharing personal stories and celebrating the accomplishments of women engineers.
- Developed girls' understanding of what engineers do by interacting with the SWE volunteers.
- Enabled girls to identify what the next steps of becoming an engineer are by interacting with the SWE volunteers and local STEM organizations at the EXPO.

Findings: Middle School Girls

After the event, nearly every girl agreed that engineering was creative (98%) and hands-on (97%), that engineering could be used in many different careers (97%), allowed one to help one's community (97%), and was fun to do (94%). Most girls also agreed that engineering was a good career choice for women (93%). These findings are consistent with last year's findings.

We asked girls to report how their attitudes and interest in engineering changed, if at all, as a result of participating in the *Invent It. Build It.* event. Slightly more than half (51%) of the girls told us they were interested in becoming an engineer before the event, and this increased to 70% after the event (Figure 3). In fact, similar to the past three years, the difference between girls' reported interest in engineering before and after the event was statistically significant and large. Further, 75% of girls saw a connection between their interests/passions and engineering.

Since engineering activities typically play a significant role in Girl Scouts' programming, we asked girls about their level of interest in joining Girl Scouts after attending the event. Twenty-seven percent of the sample of girls reported that they already were Girl Scouts. Of the remaining girls, slightly over half (52%) reported that they definitely or might be more interested in being involved with the Girl Scouts after attending the *Invent It. Build It.* event.

We asked girls if they knew what an engineer did before and after the event. Seventy-one percent of girls reported that they knew what an engineer did before the event. This number increased to 96% after the event (Figure 4). Again, similar to the past three years, the difference between girls' reported engineering knowledge before and after the event was statistically significant and large.

Additionally, as in prior years, a majority of the girls (86%) reported that they know how to find out more about engineering and technology if they wish (after participating in the event).

When asked whether their friends would support their interest in engineering or technology, 82 % of the girls reported that they would. Similarly, 88% of the girls reported that their family supports their interest in engineering or technology.

We found that most girls reported improvements in: their ability to think of many different possible ways to solve a problem (87%), their confidence in building (87%) and designing (86%) things, and their confidence in problem-solving (79%).

Nearly all girls rated the event highly, grading it 'A' (81%) or 'B' (17%). We asked girls what they liked most about the event. Several responded that they liked the whole day and described it as fun. Of the 249 girls who responded to this question, nearly two-thirds (64%) reported that they enjoyed the activities the most. The EXPO was also a big hit. Fourteen percent of girls reported that this was their favorite part of the day. The next most frequently reported "favorite aspect" of the event was learning about what engineers do and the types of jobs that could be available to them if they became engineers someday (reported by 5%). Other common responses included the opportunity to be creative (reported by 4% of girls) and working in groups or using teamwork (reported by 4% of girls).

Similar to last year, the highest rated activity overall was Seismic Shake-Up (93% rated it as very good or excellent), followed by Helping Hand (89%). Regarding relevance to engineering, most girls reported that Seismic Shake-Up and Helping Hand were both successful at demonstrating the connection to engineering (96% and 91%, respectively). We asked girls to tell us whether they felt the activities were fun. The girls reported that both the Seismic Shake-Up activity and the Helping Hand activity were fun (91% and 90%, respectively).

Finally, we asked girls to rate the extent to which each activity enabled them to be creative. Seismic Shake-Up was the slightly higher-rated activity (95% agreed or strongly agreed that it enabled them to be creative), while 93% agreed or strongly agreed that Helping Hand enabled them to be creative. But, these differences were not statistically significant.

We also asked girls to rate the EXPO using the same criteria. Most girls found the EXPO to be fun (91%), rated the EXPO highly overall (90%), saw the connection between the EXPO and what engineers do (90%), and felt the EXPO allowed them to be creative (89%).

All of the girls (100%) reported that they would recommend that other kids participate in events like IIBI, which is a significant increase over the 88% from last year. Most girls reported that they enjoyed the fact that the event was just for girls (93%); a slight increase compared to 2016 and 2015 (89% and 91%, respectively).

We asked questions about the girls' experiences with the role models with whom they worked during the event. Nearly all girls reported that the role models were approachable (96%), listened actively to the girls' ideas (95%), provided support and encouragement (98%), guided them during the activities (97%), and inspired them to consider a career in engineering or technology (90%). This year, the sashed role models handed out trading cards featuring female engineers during the EXPO. We asked the girls how many different trading cards they collected.

Forty-seven percent of the girls reported collecting 1 to 5 different trading cards, while 9% of the girls collected 6 to 10 cards and 4% of the girls collected more than 10 different trading cards.

We asked the girls about their favorite demonstration from the sashed role models during the EXPO. Sixteen percent of the girls reported that they liked all of the demonstrations. Of the remaining girls who had a favorite, the most frequently reported favorite demonstrations were robots (13%), aerospace (8%), drone (8%), slime (7%), rocket (6%), and Helping Hand (5%).

We asked girls to tell us what they would change about the event, if they could. More than one quarter (27%) reported that they wouldn't change anything about the event. This proportion is slightly higher than last year (23%) but still lower than 34% from two years ago. The most frequently reported change that girls said they would make was to add more time for both the EXPO and the activities (15%). Another popular response girls gave was that they would add more types of activities (12%).

Findings: High School Girls

After the event, a majority of high school girls (86%) reported that they know their families support their interest in engineering or technology and 85% of these same girls reported their friends would support their interest in engineering or technology.

Eighty-three percent of high school girls reported that they knew how to find out more about engineering and technology if they wished. In addition, 77% of high school girls reported that the role models inspired them to consider a career in engineering or technology and 76% reported that they saw a connection between their interests and passions and a career in engineering or technology.

Nearly all high school girls rated the event highly, grading it 'A' (59%) or 'B' (34%). We asked girls what they liked most about the event. About one-third (35%) of the girls who responded reported that they liked the activities. Fourteen percent of the girls enjoyed the EXPO, while others enjoyed the speakers (10%), or valued the chance to meet other girls like them with similar interests (10%). Others reported that they enjoyed learning from engineers, including the panel (7%). We asked girls to tell us what they would change about the event, if they could. Many reported (23%) that they would like clearer instructions while others (20%) requested more time to complete the hands-on activities or explore the EXPO.

Girls rated the EXPO highly, grading it 'A' (67%) or 'B' (21%). The most common comments about the EXPO were that the girls had fun, but that they wanted more time and more difficult activities. In addition, girls rated the Shock Absorber Activity (Ariel Biggs) very highly, grading it 'A' (63%) or 'B' (26%). The most common comments about the activity other than that they liked it, were that it was very difficult and could have benefited from clearer instructions. In addition, many girls commented that they would have liked more time and that the materials were difficult to use.

Almost all of the girls reported that they would recommend that other students participate in events like IIBI (89% said "yes" with an additional 10% saying "maybe").

Fifty-four percent of high school girls reported collecting 1 to 5 different trading cards, while 5% of the girls collected 6 to 10 cards and 3% of the girls collected more than 10 different trading cards.

We asked the girls about their favorite demonstration from the Roving Role Models during the EXPO. Thirteen percent of the girls reported that the bouncy ball demonstration was their favorite, followed by the industrial engineering demonstration (10%), the robot demonstration (8%) and biomedical engineering demonstration (8%).

Findings: Parents and Educators

The feedback from adults (engineers and non-engineers alike) who attended the event was very positive. All of the adults replied "yes" (96%) or "maybe" (4%) when asked if they would recommend the *Invent It. Build It.* event to others. As we observed in the past two years, adults rated the overall event highly, with all but one adult grading it 'A' (78%) or 'B' (21%).

We also asked adults to rate each segment of the event with a grade. Most adults gave 'A' or 'B' ratings to each segment including non-engineers, just like the past two years.

Nearly all the participants, regardless of whether they were engineers, agreed or strongly agreed with the following statements:

- This event helped me learn where to find resources for girls/my daughter (95% of all adults and 93% of non-engineers, consistent with 2016).

- I feel empowered to help more girls/my daughter become an engineer someday if they want to (95% of all adults and 94% of non-engineers, consistent with 2016).
- This event helped me feel well-equipped to talk with girls/my daughter about a career in engineering (97% of all adults, including non-engineers, consistent with 2016).
- This event helped me understand why engineering is a good career choice (96% of all adults and 99% of non-engineers, representing a slight increase over 2016).
- This event taught me some activities I can do with girls/my daughter (89% of all adults and 91% of non-engineers, representing a slight increase over 2016).
- This event helped me understand what engineers do (94% of all adults and 93% of non-engineers, representing a slight increase over 2016).
- I had a chance to meet professional engineers today (97% of all adults and 96% of non-engineers, representing a slight increase over 2016).
- I had fun today (98% of all adults and 97% of non-engineers, representing a slight increase over 2016).
- My goals were met today (92% of all adults and 88% of non-engineers, representing a significant increase over 2016).
- This event helped me to understand what it takes to become an engineer (84% of all adults and 81% of non-engineers, consistent with 2016).
- All my questions were answered today (85% of all adults and 82% of non-engineers, representing a slight increase over 2016).

As in previous years, parents were less likely to agree that the event helped them understand why there were so few women in engineering:

- This event helped me understand why there are so few women in engineering (77% of all adults and 79% of non-engineers, consistent with 2016).



We asked adults to report what they learned at the event that they did not know beforehand. The most popular response was that they learned about the wide range of engineering disciplines and careers that existed within the field of

engineering (36%). Another 21% of adults reported that they learned about the various resources available to them.

We asked the adults what features they liked most about the event. The most popular response was that adults enjoyed learning from the panel (22%). Similarly, 21% mentioned the EXPO and 11% mentioned the hands-on activities as what they liked the best. Adults also appreciated the overall positive experience for their child (8%).

We asked adults to make suggestions for enhancing the event. Sixteen percent reported that they would not change anything about the event, which is down from 31% last year. Of the adults who did make suggestions, 20% reported that they would like more information across a variety of areas. In addition, some (10%) reported they would like to add more time and/or space for the EXPO. Another 10% indicated that they would like the conference to come back to Austin.

Thirty-five percent of adults reported collecting 1 to 5 different trading cards, while 9% of the adults collected 6 to 10 cards and 1% of the adults collected more than 10 different trading cards.

We asked the adults about their favorite demonstration from the Roving Role Models during the EXPO. The most popular response was the industrial engineering helicopter (10%), followed by the helicopter demonstration (7%), robot demonstration (7%), biomedical engineering demonstration (7%), Lego airplane demonstration (7%), and the water filter demonstration (7%).

Findings: EXPO Exhibitors

Again this year, EXPO Exhibitors were surveyed and while they rated the EXPO positively, grading it 'A' (34%) or 'B' (48%), the rating does represent a decrease from the ratings last year of 'A' (37%) or 'B' (59%).

All of the exhibitors (100%) reported that the set-up and tear-down of the booth went smoothly. Almost all of the exhibitors (97%) enjoyed interacting with the adults and children who visited their booths, while 90% of exhibitors enjoyed the fact that this was an event for girls. Most of the exhibitors (89%) reported that they would be interested in exhibiting at other SWE conferences, whether local or national. Eighty-six percent of exhibitors agreed or strongly agreed that registration went smoothly and 76% perceived that their booth received enough interest and foot traffic.

Seventy-two percent of exhibitors agreed that the on-site check-in process was helpful. More than half of the exhibitors agreed or strongly agreed that SWE's IBI EXPO compares favorably with others where they have exhibited (62%), but less than half (43%) agreed the fee for exhibitor registration was reasonable.

We asked exhibitors what they liked most about the EXPO. Over a quarter (28%) liked interacting with the girls. In addition, 21% of the exhibitors enjoyed the morning session, noting the enthusiasm and engagement of the girls during that time. Other comments from exhibitors about what they liked most included the space and support staff (14%) and the variety of hands-on activities and attendees (10%).

Finally, we asked exhibitors what they would change. Almost three-quarters of the exhibitors would like to increase the afternoon attendance at the EXPO or balance attendance better across the entire day.

Findings: SWENext Members

This year, for the first time ever, we asked SWENext members about their involvement with the organization. First, we asked them how long they have been a member of SWENext. Of the 25 members who responded, slightly less than half (48%) had been members for 6 months or less, while 36% had been members for a year or less, 12% for 2 years or less, and 4% had been members for 3 years or less.

Next, we asked members the reasons why they are members of SWENext. The majority of members (80%) indicated they joined because they wanted to learn about engineering. Just under two-thirds of members also reported that they joined because they wanted to be a part of the Society of Women Engineers community. Other reasons included wanting to participate in fun activities (48%), they are members of Girl Scouts, FIRST Robotics team or other organization (36%), their parent(s) or teacher encouraged them to join (36%), they joined at Invent It Build It, Design Lab or other engineering outreach event, and a desire to be with their friends (4%).

We also asked members what SWE-related activities they have been a part of in the past 12 months. A majority of members (80%) attended SWE Invent It Build It. Forty percent of members also read the SWENext Newsletter while a little more than a quarter of members (28%) attended a local SWE Engineering outreach event. Other activities members participated in included: SWENext clubs (24%), winning a SWENext Innovator Award (16%), winning a SWENext High School Community Award (16%), attending a SWENext Design Lab (12%), reading SWEet Wisdom (8%), participating on the SWENext Facebook Group

(4%), reading articles on the SWE All Together blog (4%), participating on SWENext Twitter (4%), and applying for a SWE scholarship (4%).

We asked SWENext members what they liked most about SWENext. Nearly one-third (32%) of SWENext members reported they liked the sense of community and meeting other girls with the same interests. In addition, nearly another third (32%) reported that they liked the SWENext events that were offered. Other aspects of SWENext that members appreciated were the engineering activities (16%) and the ability to network with other girls and the SWE mentors (12%).

Finally, we asked SWENext members for suggestions on ways to improve SWENext. Thirty-eight percent of members suggested additional outreach by the way of more conferences, activities, and local gatherings of SWENext chapters. Other suggestions included more ethnic diversity of members (14%) as well as more information regarding engineering disciplines and career paths (10%).

Background

On Saturday, October 28, 2017 the Society of Women Engineers (SWE), Girl Scouts of the USA, WGBH's Design Squad Global, the ExxonMobil Foundation, and Techbridge held the eighth annual day-long collaborative event *Invent It. Build It.* for middle school girls at the SWE annual conference in Austin, TX. SWE invited middle school girls, high school girls, their parents/guardians, and educators (both formal and informal educators) to participate.

A total of 307 middle school girls attended the event, along with 184 parents and/or educators, and 113 high school students. Deysi Melgar, a cast member from Season 2 of WGBH's *Design Squad*, served as the special host of the event. In addition, 427 SWE members volunteered at the event to facilitate the activities, act as role models, and work closely with the middle school girls throughout the day, including acting as "Roving Role Models" during check-in. Twenty-nine exhibitors provided information about camps, competitions and resources as part of the *Invent It. Build It.* EXPO. The schedule of events and activities for the girls as well as their parents and educators are included in Appendix A.

The purpose of the event was to:

- Change girls' attitudes about engineering careers by exposing them to different ways of thinking about engineering.
- Engage girls in two different hands-on engineering activities to build their self-confidence and critical thinking skills as they relate to engineering.
- Enable girls, parents, and educators to meet and network with engineering role models.
- Help girls draw connections between their career passions and engineering by sharing personal stories and celebrating the accomplishments of women engineers.
- Develop girls' understanding of what engineers do by interacting with the SWE volunteers.
- Enable girls to identify what the next steps of becoming an engineer are by interacting with the SWE volunteers and local STEM organizations at the EXPO.

The middle school kids spent the majority of their day engaging in two different hands-on engineering activities with engineer mentors. These activities included:

- **Seismic Shake-Up** – Kids were asked to design and build a structure using coffee stirrers and clay that’s stable and sturdy enough to survive an earthquake’s vibrations, build a shake table and then test, evaluate and redesign their structure.
- **Helping Hand** – Kids were asked to design and build a device that lets them grab different objects and drop them into a container that’s at least two feet away from them.

The kids’ detailed activity sheets are included in Appendix B.

Parents and educators were invited to spend the day engaged in a separate set of activities—networking with engineers and each other, participating in two panel discussions with SWE members and outreach experts, and doing a hands-on activity of their own (Design Squad’s Safe Landing– design and build a system to deliver goods safely in an air drop).

Study Design

Concord Evaluation Group (CEG) conducted an evaluation study to learn about the event’s impact on girls as well as to discover ways to enhance future *Invent It. Build It.* events. CEG collaborated with SWE to refine five surveys and a comment card to collect feedback on the event from its participants. These data collection instruments are included in Appendix C.

The student surveys were administered to girls at the end of the day. The adult survey was administered to parents/educators at the end of the day. Another survey was administered to exhibitors who participated in the EXPO. During the event, we also asked girls to complete a comment card after they completed both of the hands-on engineering activities and the EXPO (Figure 1).

Activity allowed me to be creative. <i>disagree 1 2 3 4 5 agree</i> <i>neutral</i>	Overall this activity was... <i>poor 1 2 3 4 5 excellent</i> <i>good</i>	I see the connection between this activity and what engineers do. <i>disagree 1 2 3 4 5 agree</i> <i>neutral</i>
	<u>Expo</u>	
	This activity was fun. <i>disagree 1 2 3 4 5 agree</i> <i>neutral</i>	

Figure 1. Comment card.

Participants

Middle School Girls

As in previous years, the girls who attended the event were from diverse backgrounds. Just over a third of the girls identified themselves as White (37%), just under a third (30%) of participants were Hispanic, 19% were Asian, 9% were Black or African-American, and 10% preferred not to answer. An additional 3% were Native Hawaiian, Native Alaskan, Native American, or Pacific Islander while 11% selected “other,” some indicating they were of multiple races or ethnicities. Compared to last year, fewer girls this year identified themselves as White or as Black or African-American. A greater percentage this year identified themselves as Hispanic, Latina, or Spanish or Asian American. The grades of the girls were ranged from fourth to eighth, plus one home school student, with two-thirds (66%) in either seventh or eighth grade.

**Table 1:
Middle School Girls’ Background Characteristics**

	Number and Percent
<i>Race/ethnicity</i>	N = 242
White or European American	89 (36.8%)
Hispanic, Latina, or Spanish	72 (29.8%)
Asian American	46 (19.0%)
Prefer Not to Answer	25 (10.3%)
Black or African-American	21 (8.7%)
Native American or Alaskan Native	6 (2.5%)
Native Hawaiian or Pacific Islander	3 (1.2%)
Other	27 (11.2%)
<i>Grade</i>	N = 238
Fourth	1 (0.4%)
Fifth	2 (0.8%)
Sixth	77 (32.4%)
Seventh	87 (36.6%)
Eighth	70 (29.4%)
Home School	1 (0.4%)

Note: Some girls selected more than one ethnicity, so percentages do not add up to 100%.

Each girl was asked if she was a member of SWENext. Of the girls who responded (N=239), 96% were not members and 4% were members of SWENext. In addition, each girl was asked if she was a member of a SWENext Club. Of the girls who responded (N=239), almost all the girls (99%) were not members. Only one girl responded that she was a member and one other girl did not know if she was a member of a SWENext Club.

High School Girls

For the third year, SWE also collected data from a sample of high school girls. Forty percent of the high school girls identified themselves as White, 40% were Hispanic, Latina, or Spanish, 14% were Black or African-American, and 10% were Asian American. The high school girls were in grades nine through twelve. Their background characteristics are summarized below.

**Table 2:
High School Girls' Background Characteristics**

	Number and Percent
<i>Race/ethnicity</i>	N = 104
White or European American	42 (40.4%)
Hispanic, Latina, or Spanish	42 (40.4%)
Black or African-American	15 (14.4%)
Asian American	10 (9.6%)
Other	4 (3.8%)
Native American or Alaskan Native	2 (1.9%)
Native Hawaiian or Pacific Islander	1 (1.0%)
<i>Grade</i>	N = 104
Ninth	44 (42.3%)
Tenth	21 (20.2%)
Eleventh	20 (19.2%)
Twelfth	19 (18.3%)

Note: Some girls selected more than one ethnicity, so percentages do not add up to 100%.

We asked the high school girls if they were members of SWENext. Of the 103 girls who provided an answer, 15% indicated they were, while 85% indicated they were not. We also asked the girls if they were members of a SWENext club. Of the 101 girls who provided an answer, 5% indicated they were, while 95% indicated they were not.

Parents and Educators

Parents, educators, and troop leaders attended the conference and completed surveys at the end of the day. In total, 98 adults completed surveys. Table 3 summarizes their background characteristics. Similar to the girls, adults more frequently self-identified as White (59%) than Asian American (19%) or Hispanic, Latino/a, or Spanish (18%) or Black or African-American (6%) or other races/ethnicities.

**Table 3:
Adults' Background Characteristics**

	Number and Percent
<i>Race/ethnicity</i>	N = 97
White or European American	57 (58.8%)
Asian American	18 (18.5%)
Hispanic, Latino/a, or Spanish	17 (17.5%)
Black or African-American	6 (6.1%)
Prefer Not to Answer	2 (2.1%)
Other	3 (3.1%)
Native American or Alaskan Native	1 (1.0%)
<i>Relationship to girls attending the event</i>	N = 95
Mother	69 (72.6%)
Father	15 (15.8%)
Guardian	2 (2.1%)
Troop Leader	19 (20.0%)
Teacher	19 (20.0%)
Other (aunt, grandparent, engineer, etc.)	6 (6.3%)
<i>Professional engineer</i>	N = 94
No (includes engineering students)	69 (73.4%)
Yes	25 (26.6%)
<i>Affiliation with SWE</i>	N=95
Not Affiliated	65 (68.4%)
Parent/Guardian of SWENext Member	21 (22.0%)
SWE Collegiate or Professional Member	3 (3.2%)
K-12 Educator Member	3 (3.2%)
Other	2 (2.1%)

	Number and Percent
SWENext Club Advisor	1 (1.1%)
<i>Level of Students They Work with in Education Field</i>	N=94
Not in education field	55 (58.5%)
Middle School	23 (24.5%)
High School	12 (12.8%)
Elementary	11 (11.7%)
Other	5 (5.3%)
Pre-K	3 (3.2%)
College	2 (2.1%)

Note: The adults selected more than one ethnicity, relationship to girls and level of students they work with; so, percentages for those background characteristics do not add up to 100%.

EXPO Exhibitors

SWE surveyed EXPO exhibitors. In total, 29 exhibitors completed surveys. Demographic information was not collected.

SWENext Members

A total of 25 SWENext members were surveyed. Table 4 summarizes their length of membership in the program.

**Table 4:
SWENext Length of Membership**

	Number and Percent
	N = 25
6 months or less	12 (48.0%)
1 year or less	9 (36.0%)
2 years or less	3 (12.0%)
3 years or less	1 (4.0%)
3 or more years	0 (0.0%)

Findings

Middle School Girls

Attitudes and Beliefs about Engineering

Since one objective for the event was to encourage girls to think about engineering as a future career choice, we asked middle school girls to indicate the extent to which they believed that engineering embodied desirable characteristics of a future job. Consistent with previous years, nearly every girl agreed that engineering was creative (98%) and hands-on (97%), that engineering could be used in many different careers (97%), allowed one to help one's community (97%), and was fun to do (94%). Most girls also agreed that engineering was a good career choice for women (93%) (Figure 2).

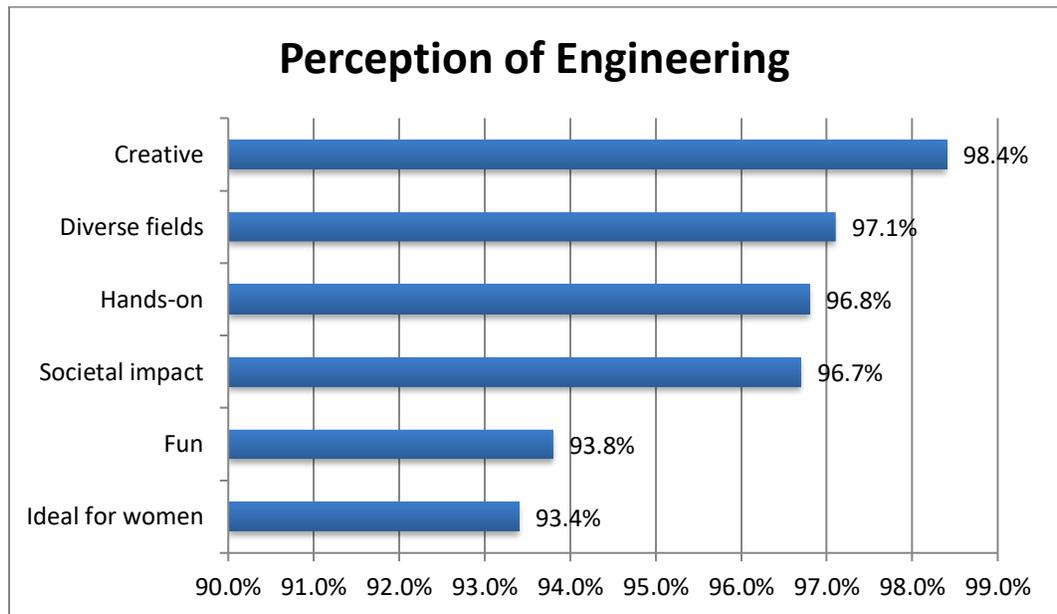
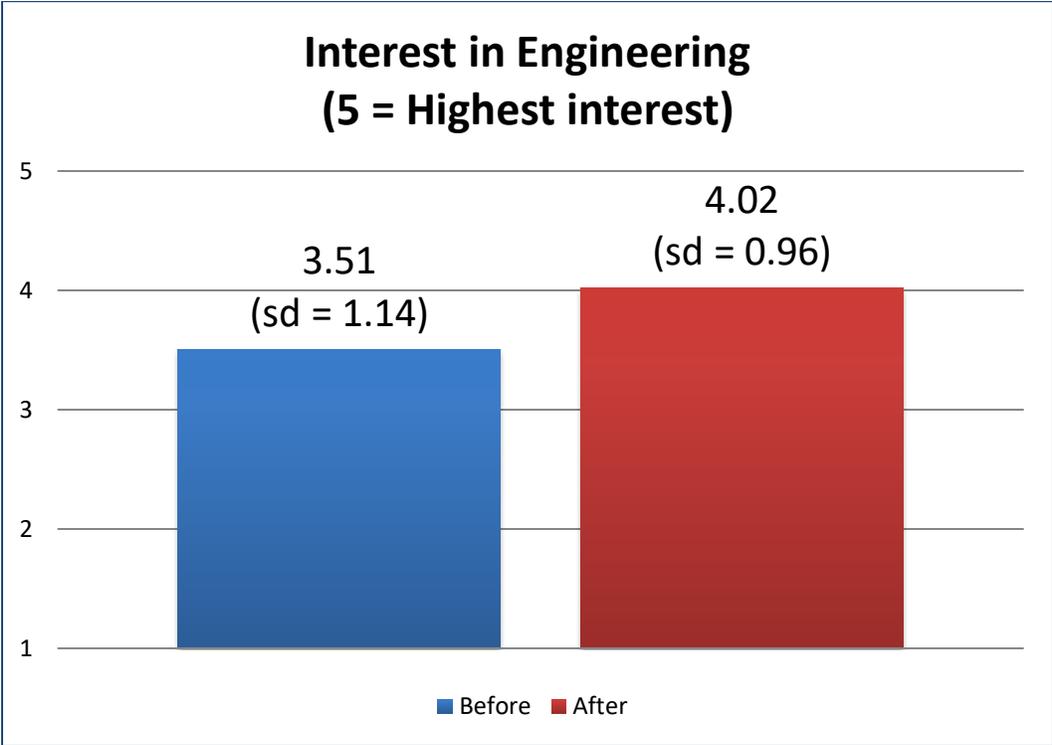


Figure 2. Perceptions of engineering.

We asked girls to report how their attitudes and interest in engineering changed, if at all, as a result of participating in the *Invent It. Build It.* event. Fifty-one percent of girls told us they were interested in becoming an engineer before the event, and this increased to 70% after the event (Figure 3). In fact, similar to the past three years, the difference between girls' reported interest in engineering

before and after the event was statistically significant and large. Further, 75% of girls saw a connection between their interests/passions and engineering.¹



Note: Paired t-test (df = 239) = 9.474, p < 0.000), Cohen's d effect size = 0.48.

Figure 3. Average level of self-reported interest in becoming an engineer before and after *Invent It. Build It.*

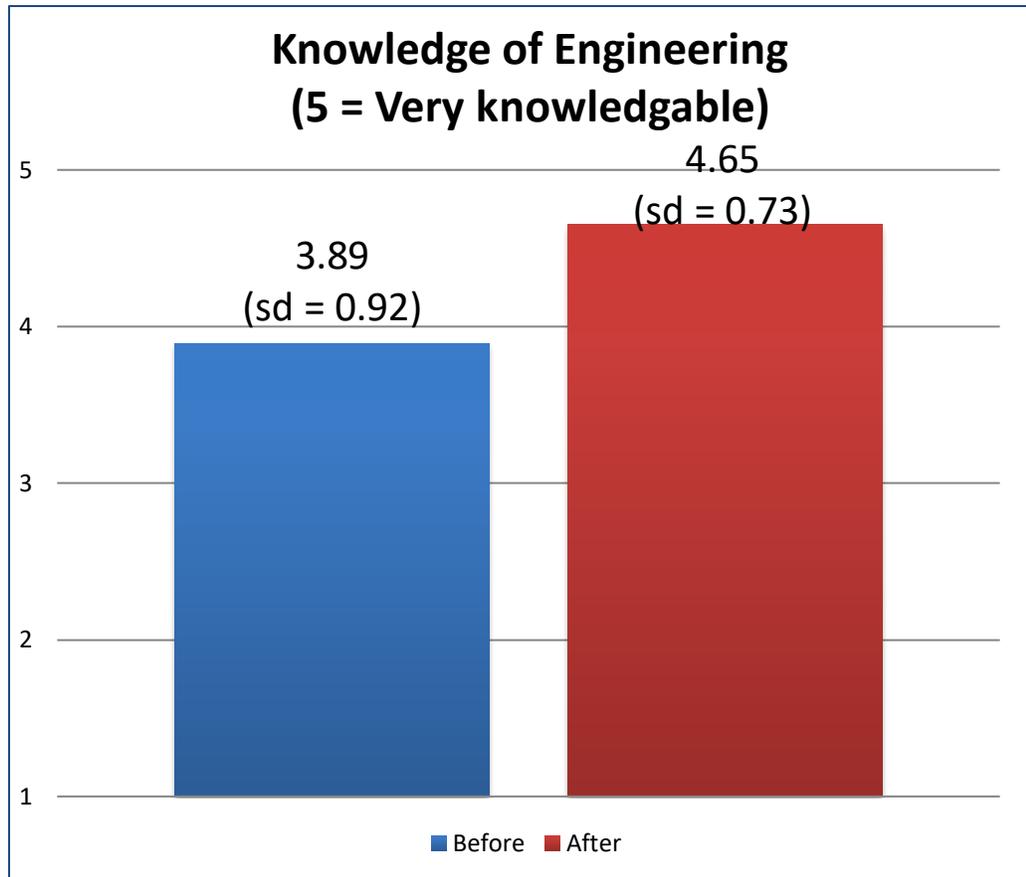
Like the last two years, most girls also reported that they know their friends would support their interest in engineering or technology (82%) and that their families would support their interest in engineering or technology (88%).

Since engineering activities typically play a significant role in Girl Scouts' programming, we asked girls about their level of interest in joining Girl Scouts after attending the event. Slightly more than one-quarter of the sample of girls reported that they already were in Girl Scouts (27%). Of the remaining girls, slightly over half (52%) reported that they definitely or might be more interested in being involved with the Girl Scouts after attending the *Invent It. Build It.* event.

¹ We did not ask girls to report whether their perceptions of these connections were impacted by the event, so we have no way of knowing whether IIBI caused these connections to form or whether girls attending the event saw these connections before coming to the event.

Knowledge of Engineering

We asked girls if they knew what an engineer did before and after the event. Seventy-one percent of girls reported that they knew what an engineer did before the event. This number increased to 96% after the event. Again, similar to the past three years, the difference between girls' reported engineering knowledge before and after the event was statistically significant and large.



Note: Paired t-test (df = 246) = 12.769, $p < 0.000$, Cohen's d effect size = 0.92.

Figure 4. Average level of self-reported knowledge about engineering before and after *Invent It. Build It.*

Additionally, as in prior years, most of the girls (86%) reported that they know how to find out more about engineering and technology if they wish (after participating in the event).

Confidence in Engineering-related Skills

Another one of the event goals was to increase girls' confidence in engineering-related skills. We found that most girls reported improvements in: their ability to think of many different possible ways to solve a problem (87%), their confidence in building (87%) and designing (86%) things, and their confidence in problem-solving (79%).

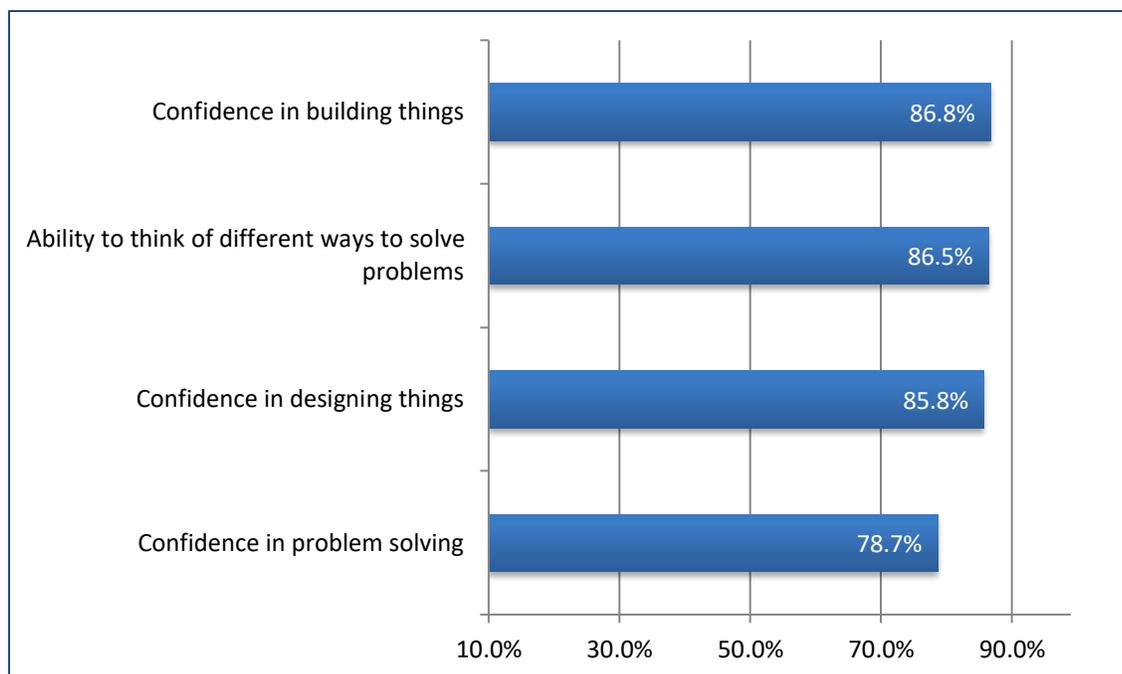


Figure 5. Proportion of girls' who reported improvements in engineering-related confidence and abilities after participating in the *Invent It. Build It.* event.

Feedback on the Event

Nearly all girls rated the event highly, giving it a grade of 'A' (81%) or 'B' (17%). We asked girls what they liked most about the event. Several responded that they liked the whole day and described it as fun. Of the 248 girls who responded to this question, nearly two-thirds (64%) reported that they enjoyed the hands-on activities the most. For example, some girls reported:

- *[I liked] that we did fun activities and learned from them and that I went up on stage and showed everyone my project I did.*
- *The helping hand is ...my favorite. My table's leaders were having fun with the conversation.*
- *I liked doing the Seismic activity and the Road.*

- *What I liked most about today was the different activities we did and I also liked the teamwork.*
- *I like how we get to make our own things. If it was just people talking, it would be boring but we got to make it ourselves.*
- *I like when we build the structure to see if an earthquake can destroy the building design.*
- *I liked all of the projects but I enjoyed building a house that could withstand an earthquake the best.*
- *I really liked the helping hand activity because we got to make it our own with materials. I really liked all of the activities because I had fun being creative with new friends.*
- *I liked building and creating new innovative ideas.*

Once again, the EXPO was also a big hit. Fourteen percent of girls reported that the EXPO was their favorite part of the day and an additional 9% reported the EXPO as their second favorite activity. For example, some girls reported:

- *I liked the booths and what the people at them taught you and informed you about. The activities were cool too.*
- *I liked the Expo and seeing different companies/schools.*
- *I liked the expo because it was fun seeing different engineers. I also liked building the tower.*
- *I loved seeing all of the booths in the expo hall and the activities were fun.*
- *I really like the variety of different activities at the Expo.*

The next most frequently reported “favorite aspect” of the event was the fact that girls were able to learn about what engineers do and the types of jobs that could be available to them if they became engineers someday (reported by 5%). For example, some girls reported:

- *I loved how it helped me be creative, and learn about engineering.*
- *Learning different jobs of engineering.*
- *I liked getting to explore different career paths with new friends.*

Another common response was that girls enjoyed the opportunity to be creative (reported by 4% of girls). For example, some girls reported:

- *I liked the opportunity to create.*
- *[I liked] the creativity and the environment.*
- *What I like the most is creating and designing to each project.*
- *I liked how fun and making your brain work to solve the problem (realistic problems).*

An additional 4% of the girls reported that their favorite part of the event was using teamwork and working in groups. For example, some girls reported:

- *I liked how it let us be in groups and work together and how it let us be creative.*
- *I like that this helps us with our team building skills.*
- *I liked working with other people and testing out ideas.*
- *I really liked the part where I got to work a in a team and create many wonderful inventions.*
- *I love to work as a team to create something cool.*
- *I liked how we were in teams and worked together. I also liked how we all had different ideas.*

To gather additional feedback on the activities, we asked the girls to comment on both activities, Helping Hand and Seismic Shake-Up, immediately after they completed them. For each activity, we asked the girls to rate the extent to which they thought the activity was poor to excellent, the extent to which they saw a connection between this activity and what engineers do, whether the activity was fun, and whether the activity allowed them to be creative.

The highest rated activity overall was Seismic Shake-Up (93% rated it as very good or excellent), followed by Helping Hand (89%). Seismic Shake-Up was rated higher than Helping Hand, but the difference was not statistically significant ($t_{(df=448.837)} = 1.78, p = 0.08$).

Regarding relevance to engineering, most girls reported that Seismic Shake-Up and Helping Hand were both successful at demonstrating the connection to engineering (96% and 90%, respectively). There was no statistically significant difference between the activities in terms of the relevance to engineering ($t_{(df=467.319)} = 1.63, p = 0.10$).

We asked girls to tell us whether they felt the activities were fun. Slightly more girls reported that the Seismic Shake-Up activity was fun (91%) versus the Helping Hand activity (90%), but again, the difference was not statistically significant ($t_{(df=466.717)} = 1.70, p = 0.09$).

Finally, we asked girls to rate the extent to which each activity enabled them to be creative. While Seismic Shake-Up was the slightly higher-rated activity (95% agreed or strongly agreed that it enabled them to be creative and 93% agreed or strongly agreed that Helping Hand enabled them to be creative), the differences were not statistically significant ($t_{(df=483)} = 1.06, p = 0.08$).

We also asked girls to rate the EXPO using the same criteria. Most girls found the EXPO to be fun (91%), rated the EXPO highly overall (90%), saw the

connection between the EXPO and what engineers do (90%), and felt the EXPO allowed them to be creative (89%).

Almost all girls reported that they would recommend that other kids participate in events like IIBI (90%) and the remaining 10% said “maybe” they would. Most girls reported that they enjoyed the fact that the event was just for girls (93%), up from last year (89%), two years ago (91%) and three years ago (83%).

This year, we asked five questions about the girls’ experiences with the role models with which they worked during the event. Nearly all girls reported that the role models provided support and encouragement (98%), guided them during the activities (97%), were approachable (96%), listened actively to the girls’ ideas (96%), and inspired them to consider a career in engineering or technology (90%).

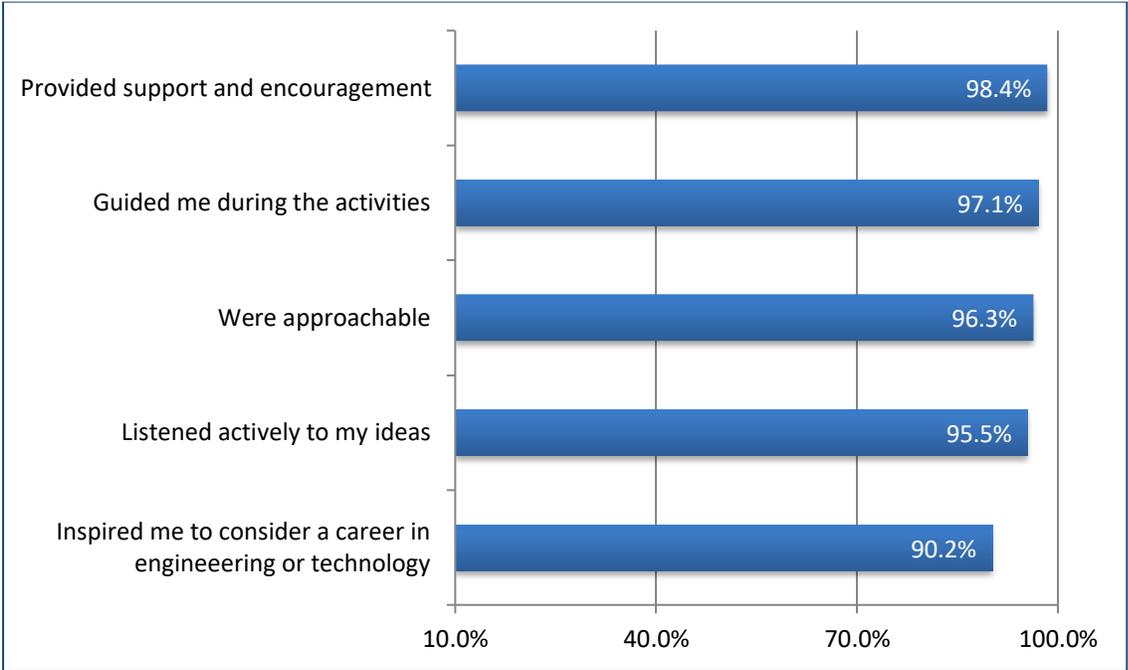


Figure 6. Proportion of girls’ who reported improvements in engineering-related confidence and abilities after participating in the *Invent It. Build It.* event.

Suggestions for Improvement

We asked girls to tell us what they would change about the event, if they could. Of the 234 girls who answered, slightly more than a quarter (27%) reported that they wouldn't change anything about the event. This proportion is up from 23% last year but down from 34% two years ago. For example, some girls reported:

- *This event was perfect! I wouldn't change a thing!*
- *I don't think I'd change anything, this was very fun and I enjoyed it very much!*
- *I wouldn't change anything. It's great for girls who want to be an engineer.*
- *I wouldn't [change anything], it is the greatest thing I have ever done.*

The most frequently reported change that girls said they would make was to add more time (15%), especially for the activities (27%) and the EXPO (21%). For example, some girls reported:

- *Add more time to the activities.*
- *I would give more time to building contraptions for the girls.*
- *Maybe do a two day event for more activities! Other than that it is awesome!*
- *Have more time to look at all the vendors.*
- *I would change it to where we would have the chance to do more of the EXPO.*

Another popular response girls gave was that they would add activities (12%). For example, some girls reported:

- *We'll do more hands-on and things that are more creative.*
- *You would do more than one activity.*
- *More activities that didn't take as long.*

Other aspects that girls reported they would change included better and more appropriate food options at lunch (6%), different or more challenging activities (5%), and letting girls sit with and work wherever and with whomever they want (4%). For example, some girls reported:

- *I would change this event by letting people sit where you would like. I work better with friends than strangers.*
- *I would allow groups to stay together.*
- *Better lunches that's about it.*

- *I wish it was a little different (the activities) from last year, and that allergies would be more specific (the cookie apparently had Macadamias although everything was supposed to be nut free).*
- *More food.*
- *We should do projects suitable for the outdoors.*
- *I would give out puzzle-like assignments.*
- *I would offer higher-level engineering activities*

High School Girls

Attitudes and Beliefs about Engineering

Eighty-six percent of high school girls reported that they knew their families supported their interest in engineering or technology, which is down from last year (94%).

Eighty-three of high school girls reported that they knew how to find out more about engineering and technology if they wished, which is down from last year (90%).

Eighty-five percent reported that they knew their friends would support their interest in engineering or technology, which is down slightly from last year (88%).

Seventy-six percent of high school girls reported that they saw a connection between their interests and passions and a career in engineering or technology, which is down from past year (83%).

This year we also asked the girls if they were inspired by their role models to consider a career in engineering or technology. More than three-quarters (77%) of the girls agreed that their role models inspired them to consider an engineering or technology career.

We did not ask these questions before girls attended the event, so it is possible that girls came to the event with these attitudes and beliefs already and we cannot conclude with certainty that the event itself impacted these beliefs.

Feedback on the Event

Nearly all high school girls rated the event highly, giving it a grade of 'A' (59%) or 'B' (34%). We asked girls what they liked most about the event. More than one-third (35%) of the girls who responded reported that they liked the activities:

- *Chosen challenge was fun, easily understood. Teamwork encouraged.*
- *Getting messy and fun.*
- *I enjoyed the challenge of this activity. It really made you think. I also really liked our instructor Jessica. She was very nice and friendly.*
- *I like the hands-on activity involved. It helped me understand and enjoy.*
- *I liked building the brake with a group because it was a great hands-on activity.*

- *I liked building the Design Challenge. This was a new experiment/challenge that I had never done before. I also liked building a bouncy ball.*

Others valued the chance to meet other girls like them, with similar interests, as well as engineers working in the field:

- *The event brought me to meet new people and working as a team together to achieve a goal which my group did.*
- *I loved getting to know people and coming together to build the project. It's interesting to hear people's ideas come together.*
- *There were so many people who were in the engineering field. There were many networking opportunities.*
- *I liked how the instructors were actual engineers from around the country.*

Others reported that they enjoyed the EXPO:

- *I enjoyed the EXPO hall because we were allowed to talk to many different people about their careers.*
- *I liked the different stations of clubs, colleges before the conference. I also liked the challenge of building a caliber.*
- *The companies in exhibit hall 1, it was helpful in learning options for jobs and internships.*

Others reported that they appreciated the presentations, specifically Ariel Biggs:

- *Ms. Bigg's Presentation was very insightful.*
- *I really loved how excited Ms. Biggs was showcasing a female in a field that we think is male dominant. I love that this is something that I've never done in my life.*
- *The guest speaker was very enthusiastic and made me extremely excited to try this project. I also liked that we got split up so we could meet new people*
- *The speaker, Ariel Biggs because her enthusiasm makes you want to be an engineer.*

We asked high school girls to rate two distinct aspects of the event, the EXPO and the Shock Absorber Activity (Ariel Biggs). Girls rated the Shock Absorber Activity (Ariel Biggs) very highly, with most girls giving it a grade of 'A' (63%) or 'B' (26%). Some girls reported:

- *I love Ariel, such a role model.*
- *This was too cool! I've never done anything like it.*

- *The project was a one-of-a-kind.*

Girls rated the EXPO highly, giving it a grade of 'A' (67%) or 'B' (21%). Almost all of the comments indicated the girls would have liked more time to explore the EXPO. Some girls reported:

- *[I would like] more science, less arts and crafts.*
- *I like the small activities and info offered.*
- *Fun, I love free stuff.*
- *Good resources and contacts for internships.*

Almost all girls reported that they would recommend that other students participate in events like IIBI (89% said "yes" with an additional 10% saying "maybe").

Suggestions for Improvement

When asked to report on what they could change about the event, if they were in charge, many reported that they would like clearer instructions for the activity:

- *Clearer instructions and materials lists.*
- *I think the event was overall great, except I might make the instructions slightly more clear as I was slightly confused at first.*
- *I would explain the process in further detail in building the project.*
- *If there would have been an example model for us to go off of and if the instructions for the idea were more specific.*
- *Make the instructions for the activity more clear/label the materials more clearly.*
- *Make the pictures and directions a little clearer.*

Other feedback included allowing for more time to complete the hands-on activities and more time to explore the EXPO:

- *Allow more time for activity and provide more specific instructions.*
- *Exactly the same, except more time to build/finish.*
- *I would try and have more time for multiple mini events or games to diversify the event and allow for more routes of creativity.*
- *I would try to manage time in a better way.*
- *I wouldn't change anything, just have a little more time to test.*
- *Make more time for challenge instead of PowerPoint presentation.*
- *More expo exhibits time.*
- *More time and more diverse (Inclusion of African American Girls).*

Other suggestions included:

- *I would use water and not oil because the oil was just a mess.*
- *I would teach the volunteers the challenge so they can help better.*
- *I think that this SWENext is very Eurocentric and white-centered just with role models and that's a little upsetting, but I had a really amazing role model who was open and honest.*
- *I would add more high up women, more booths, and more mature EXPO experiments.*
- *More information and companies that have projects at the EXPO.*
- *I would change the switching up groups. The original groups with friends would work because everybody was already comfortable.*
- *I would have pre-made stands so the stations are stable.*
- *Not have so much focus on car stuff. Make it more general to fit all types of engineering. Have someone that already completed school as an engineer be the speaker; today's was interesting but did not have very much applicable advice.*
- *Have a bigger variety of industries.*

Parents and Educators

Feedback on the Event

The feedback from adults (engineers and non-engineers alike) who attended the event was very positive. All of the adults replied “yes” (96%) or “maybe” (4%) when asked if they would recommend the *Invent It. Build It.* event to others. As we observed the past two years, adults rated the event highly, with all but one adult giving it a grade of ‘A’ (78%) or ‘B’ (21%) this year.

We asked adults to rate each segment of the event with a grade. Most adults gave ‘A’ or ‘B’ ratings to each segment, even non-engineers (see Table 5).

**Table 5:
Adults’ Event Segment Ratings**

	Number and Percent (All adults)	Number and Percent (Non-engineers)
<i>EXPO</i>	N = 92	n = 65
A	61 (66.3%)	43 (66.2%)
B	19 (20.6%)	12 (18.5%)
C	3 (3.3%)	3 (4.6%)
D	1 (1.1%)	1 (1.5%)
F	0 (0.0%)	0 (0.0%)
Did not attend	8 (8.7%)	6 (9.2%)
<i>Panel Discussion 1: Why Engineering?</i>	N = 91	n = 66
A	68 (74.7%)	47 (71.2%)
B	19 (20.9%)	15 (22.7%)
C	2 (2.2%)	2 (3.0%)
D	0 (0.0%)	0 (0.0%)
F	0 (0.0%)	0 (0.0%)
Did not attend	2 (2.2%)	2 (3.0%)
<i>Safe Landing Hands-on Activity</i>	N = 67	n = 49
A	44 (65.7%)	30 (61.2%)
B	13 (19.4%)	10 (20.4%)
C	2 (3.0%)	2 (4.1%)
D	1 (1.5%)	1 (2.0%)
F	0 (0.0%)	0 (0.0%)

	Number and Percent (All adults)	Number and Percent (Non-engineers)
Did not attend	7 (10.4%)	6 (12.2%)
<i>Panel Discussion 2: Preparing for Engineering Success</i>	N = 80	n = 59
A	45 (56.2%)	32 (54.2%)
B	21 (26.2%)	15 (25.4%)
C	6 (7.5%)	5 (8.5%)
D	1 (1.3%)	1 (1.7%)
F	1 (1.3%)	1 (1.7%)
Did not attend	6 (7.5%)	5 (8.5%)
<i>Panel Discussion 2: SWENext: Building the Next Generation of Engineers</i>	N = 49	n = 37
A	22 (45.0%)	13 (35.1%)
B	11 (22.4%)	10 (27.0%)
C	5 (10.2%)	5 (13.5%)
D	1 (2.0%)	1 (2.7%)
F	1 (2.0%)	1 (2.7%)
Did not attend	9 (18.4%)	7 (18.9%)

We further analyzed the data from the three panel discussions, by looking at ratings of parents (mother or father or guardian), troop leaders and educators (see Table 6). The feedback on Panel Discussion 1 was very positive across all three participant groups, with almost all (95%) of parents and educators and all (100%) troop leaders giving a grade of 'A' or 'B'. Feedback on Panel Discussion 2 (Preparing for Engineering Success) was more varied across the three participant groups. Parents gave very positive feedback, where most (89%) gave it a grade of 'A' or 'B'. However, troop leader and educator feedback was less positive, where a majority of participants (78% and 73%, respectively) gave it a grade of 'A' or 'B'.

Feedback on Panel Discussion 2 (SWENext: Building the Next Generation of Engineers) was much less positive across all 3 participant groups. Seventy percent of parents gave it a rating of 'A' or 'B', while slightly less than two-thirds (64%) of educators and only half (50%) of troop leaders rated it an 'A' or 'B'. Participants reported:

- *Need more time.*
- *Too much army, not enough engineering.*
- *More SWENext information in person - I will look up online.*

- *Great moderation to keep on tracking and answer so many questions.*
- *Some in audience need to be cut off.*
- *Felt more like a carryover of panel 1 versus a different topic.*
- *Not a structured discussion.*
- *Some questions were just way too repetitive.*
- *Resources not as prepared.*
- *Presentation during lunch but wanted interaction. Not enough time to eat.*

**Table 6:
Ratings of Panel Discussions by Parents, Educators and Troop Leaders**

	Number and Percent (Parents)	Number and Percent (Educators)	Number and Percent (Troop Leaders)
<i>Panel Discussion 1: Why Engineering?</i>	N = 54	N = 19	N = 18
A	39 (72.2%)	13 (68.4%)	15 (83.3%)
B	12 (22.2%)	5 (26.3%)	3 (16.7%)
C	1 (1.9%)	1 (5.3%)	0 (0.0%)
D	0 (0.0%)	0 (0.0%)	0 (0.0%)
F	0 (0.0%)	0 (0.0%)	0 (0.0%)
Did not attend	2 (3.7%)	0 (0.0%)	0 (0.0%)
<i>Panel Discussion 2: Preparing for Engineering Success</i>	N = 52	N = 11	N = 18
A	33 (63.5%)	3 (27.3%)	10 (55.6%)
B	13 (25.0%)	5 (45.5%)	4 (22.2%)
C	3 (5.8%)	1 (9.1%)	2 (11.1%)
D	0 (0.0%)	1 (9.1%)	0 (0.0%)
F	1 (1.9%)	0 (0.0%)	0 (0.0%)
Did not attend	2 (3.8%)	1 (9.1%)	2 (11.1%)
<i>Panel Discussion 2: SWENext: Building the Next Generation of Engineers</i>	N = 27	N = 14	N = 6
A	12 (44.4%)	5 (35.7%)	3 (50.0%)
B	7 (25.9%)	4 (28.6%)	6 (28.6%)
C	2 (7.4%)	3 (21.4%)	0 (0.0%)
D	0 (0.0%)	1 (7.1%)	0 (0.0%)
F	1 (3.7%)	0 (0.0%)	0 (0.0%)
Did not attend	5 (18.5%)	1 (7.1%)	3 (50.0%)

Nearly all the participants, regardless of whether they were engineers, agreed or strongly agreed with the following statements:

- This event helped me learn where to find resources for girls/my daughter (95% of all adults and 93% of non-engineers, compared to 94% and 94% last year and 98% and 97% two years ago).
- I feel empowered to help more girls/my daughter become an engineer someday if they wish (95% of all adults and 94% of non-engineers, compared to 93% and 92% last year and 97% of all adults, including non-engineers, two years ago).
- This event helped me feel well-equipped to talk with girls/my daughter about a career in engineering (97% of all adults, including non-engineers, compared to 96% and 95% last year and 97% of all adults, including non-engineers, two years ago).
- This event helped me understand why engineering is a good career choice (96% of all adults and 99% of non-engineers, compared to 92% of all adults, including non-engineers last year and 97% of all adults, including non-engineers, two years ago).
- This event taught me some activities I can do with girls/my daughter (89% of all adults and 91% of non-engineers, compared to 86% and 85% last year and 97% of all adults, including non-engineers, two years ago).
- This event helped me understand what engineers do (91% of all adults and 93% of non-engineers, compared to 91% and 92% last year and 95% of all adults, including non-engineers, two years ago).
- I had a chance to meet professional engineers today (97% of all adults and 96% of non-engineers, compared to 94 % of all adults, including non-engineers last year, and 95% of all adults and 94% of non-engineers two years ago).
- I had fun today (98% of all adults and 97% of non-engineers, compared to 93% of all adults, including non-engineers, and 95% of all adults, including non-engineers, two years ago).
- My goals were met today (92% of all adults and 88% of non-engineers, compared to 81% and 79% last year and 92% and 91%, respectively, two years ago).

- This event helped me to understand what it takes to become an engineer (84% of all adults and 81% of non-engineers, compared to 83% of all adults, including non-engineers last year and which represents a decrease from 90% of all adults, including non-engineers two years ago).
- All my questions were answered today (85% of all adults and 82% of non-engineers, compared to 78% and 79% last year and 80% of all adults, including non-engineers, two years ago).

As in previous years, parents were less likely to agree that the event helped them understand why there were so few women in engineering:

- This event helped me understand why there are so few women in engineering (77% of all adults and 79% of non-engineers, compared to 79% of all adults, including non-engineers last year and 65% of all adults, including non-engineers, two years ago).

We asked adults to report what they learned at the event that they didn't know beforehand. The most popular response was that they learned about the wide range of engineering disciplines and careers that exist within the field of engineering (36%). For example, some adults reported:

- *[I learned] all the various disciplines and the flexibility in the choices to make.*
- *[I learned about] different focuses in engineering.*
- *[I learned about] different types of engineering careers available.*
- *[I learned] how many fields are associated with engineering.*
- *I learned about how many different types of engineering there are and some resources to help my students.*

The second-most popular response (21%) was that adults generally learned about the various resources available to them. For example, adults reported they learned:

- *All the resources for girls to investigate career what the options are and how to network.*
- *How to outreach to organizations.*
- *New resources to find information about engineer career opportunities.*
- *The many Army resources available and contests, as well as the SWENext resources and groups.*
- *The wealth of resources for young people to learn about engineering.*

We asked the adults what features they liked most about the event. The most popular response was that adults enjoyed learning from the panel (22%). For example, some adults reported that they enjoyed:

- *First panel was amazing.*
- *Panel presenters - their insight in their experiences was remarkable.*
- *Panel questions. A great value. Thanks to sponsors for investing in girls.*
- *Panels were interesting! Good conversations with volunteers and other attendees.*
- *The inclusion of students as the panel professionals. The access to professional engineers – amazing.*

Similarly, one fifth of adults (21%) mentioned the EXPO as what they liked the best. For example, some adults reported that they enjoyed:

- *The exhibit was great--lots of fun with great information.*
- *The trade show like outreach displays.*
- *The engineer students demonstrating in hallways. Getting information from exhibitors on specific programs available was helpful.*
- *My children enjoyed the booths and the demonstrations. I liked the parent program where we were given ideas to encourage our daughters.*

Adults also appreciated the hands on activities (11%). For example, some parents reported that they enjoyed:

- *All of the engineers with hands on activities in the hallways - very good way to learn about different disciplines and applications.*
- *Hands on activities for students speaker panels. Thank you very much for doing this program.*
- *The hands on activities at the EXPO and also all the role models available to tell more about their career and educational.*

Several adults (8%) mentioned that they appreciated the overall positive experience for their child. They reported:

- *My daughter got excited about different engineering disciplines than she had considered before.*
- *[This will help me] preparing my girl for a career.*
- *[I enjoyed] watching my daughter being inspired and seeing the amazing women and their stories.*

Other specific aspects of the event that adults appreciated were:

- The informative resources shared with them (6%).
- Discussion with others (5%).
- The special guests and speakers (5%).
- Diversity of backgrounds of the panelists and professionals (4%).
- The volunteers (2%).

Suggestions for Improvement

We asked adults to make suggestions for enhancing the event. Sixteen percent reported that they would not change anything about the event. Of the adults who did make suggestions, 20% reported that they would like more information across a variety of areas. Some adults suggested:

- *[Create] a hand out with more details about types and more potential employers--high schoolers are already thinking about this.*
- *Have some college recruiters to talk about what they're looking for and programs they have.*
- *Have someone from all engineer [types] discuss what they do.*
- *More concrete suggestions for education.*
- *More panels, many of us who attend are already converted and we want to go deeper.*
- *More undergrad admission advice.*

Ten percent of those who made suggestions for improvement reported they would add more time and space for the EXPO. Some adults suggested:

- *More space at expo exhibit tables. At lunch an engineer sat with us; maybe have round table discussions.*
- *Make the exhibits stay open later.*
- *More time for activities at the expo. Signs outside to know where to enter.*

Another ten percent of adults who made suggestions for improvements indicated that they would like the conference to come back to Austin. Other suggestions for improvement included:

- *More hands-on activities (5%),*
- *Advertising the event more widely (5%),*
- *More time, in general (5%), and*
- *Involving more men/Dads to effect change (5%).*

For example, some adults reported:

- *I would really like to hear more about these events in public schools as well.*
- *More hands-on activities.*
- *A common theme today was how mothers were getting their daughters involved in engineering but we need to have more men involved to help change this.*
- *Have it for more than 1 day for High Schoolers.*
- *More time for testing an invention.*

EXPO Exhibitors

Feedback on the Event

EXPO Exhibitors rated the EXPO positively, giving it a grade of 'A' (34%) or 'B' (48%), slightly less positively as the exhibitors from last year, who rated it 'A' (37%) or 'B' (59%).

All of the exhibitors (100%) agreed or strongly agreed that the set-up and tear down of the booth went smoothly. Almost all of the exhibitors (97%) enjoyed interacting with the adults and children who visited their booths. Ninety percent of exhibitors enjoyed the fact that this was an event for girls.

Most of the exhibitors (89%) agreed or strongly agreed that they would be interested in exhibiting at other SWE conferences, local or national. In addition, 86% of exhibitors agreed or strongly agreed that the registration went smoothly.

A majority of exhibitors agreed or strongly agreed that their booth received enough interest and foot traffic (76%), that the on-site check in process was helpful (72%), and that SWE's IIBI EXPO compares favorably with others where they have exhibited (62%). Finally, less than half (43%) of exhibitors agreed that the fee for exhibitor registration was reasonable.

We asked exhibitors what they liked most about the EXPO. Over a quarter (28%) liked interacting with the girls. For example, some reported they most liked:

- *Getting to meet the young ladies, giving them the opportunity to see what our agency has to offer.*
- *Interacting with the kids.*
- *The girls that came through for outreach.*
- *The younger students felt comfortable approaching the booths.*
- *We enjoyed interaction with the girls. Also, the variety of other exhibitors.*

In addition, twenty-one percent of the exhibitors enjoyed the morning session, noting the enthusiasm and engagement of the girls during that time. They commented:

- *9-11AM session was filled with enthusiasm.*
- *Booth location, good space, engaged girls in AM.*
- *Great organized event. I loved the traffic that came through.*
- *We loved the morning attendance.*

Another fourteen percent of exhibitors noted that the exhibitor space was good and there were enough volunteers and support staff. For example, some reported:

- *Liked the spacing of the booths and the exhibitor check-in.*
- *Number of volunteers and support staff. Booth space and resources.*
- *The layout and flow worked well.*
- *The setting was good and the partners.*
- *I liked how accessible we were to everybody (not hard to find) and the amount of girls that were available.*

Ten percent of the exhibitors liked the variety of hands on activities and attendees. They noted:

- *I liked the variety of things at the EXPO. The volunteers were very helpful in getting our booth set up.*
- *[I liked the] range of attendees, how interactive/hands-on it was.*
- *[I liked] the variety of people who came by from middle schoolers to educators.*

Other comments from exhibitors included:

- *Booths are fun.*
- *There were many opportunities to learn about engineering and education.*

Suggestions for Improvement

We asked exhibitors how they would change the EXPO for the future. Almost three quarters of the exhibitors would like to increase afternoon attendance or balance attendance better across the entire day. Suggestions and comments included:

- *[We need] better advertising for the public. It was very slow after 11:30.*
- *[There was a] difference between expo participation by girls/adults and how long vendors were expected to stay.*
- *Eliminate the afternoon section and go from 9-noon.*
- *Have 2 groups that rotate instead of having everyone leave at 11; almost no foot traffic after 11:15.*
- *Have the kids come in in shifts. After the first group they were all in sessions so we pretty much had nothing to do for 2 hours.*
- *[Schedule the] middle school in the morning, high school in the afternoon.*
- *Spread out the flow of participants.*
- *Needed access to Business Center.*

In addition, other suggestions from exhibitors included:

- *[Need] more U.S. Army stuff.*
- *Having more food venues would be nice.*
- *Offer a coffee booth for exhibitors (charge coffee).*
- *Offer a lunch and parking lot (exhibitors pay).*
- *[Need] more information of who to expect. We didn't realize so many educators would come by.*
- *Give the exhibitors a schedule of the day so we can attend events if we want.*

SWENext Members

We asked the SWENext members about the reasons they are a member of SWENext. Members were allowed to choose up to 3 reasons. Table 7 summarizes the reasons for becoming a member of SWENext.

**Table 7:
SWENext Reasons for Membership**

	Number and Percent
	N = 25
Learn more about engineering	20 (80.0%)
To be a part of the SWE community	16 (64.0%)
Participate in fun activities about engineering	12 (48.0 %)
Because I am also a member of Girls Scouts, a FIRST Robotics team, or other organization	9 (36.0%)
My parent or teacher encouraged me to join	9 (36.0%)
I joined at Invent It Build It, Design Lab or other engineering outreach event	8 (32.0%)
To be with friends	1 (4.0%)
Other	1 (4.0%)

Note: The members were asked to select up to 3 reasons for membership, so percentages do not add up to 100%.

We asked the SWE-related activities they have been a part of in the past 12 months. Table 8 summarizes the activities.

**Table 8:
Member Participation in SWE-Related Activities**

	Number and Percent
	N = 25
Attended SWE Invent It Build It	20 (80.0%)
Read SWENext Newsletter	10 (40.0%)
Attended a local SWE Engineering Outreach event	7 (28.0%)
Member of SWENext club	6 (24.0%)
Won a SWENext Innovator Award	4 (16.0%)
Won a SWENext High School Community Award	4 (16.0%)
Attended SWENext Design Lab	3 (12.0%)

	Number and Percent
Read SWENext Wisdom	2 (8.0%)
Participate on the SWENext Facebook Group	2 (8.0%)
Read articles on the SWE All Together Blog	2 (8.0%)
Other	2 (8.0%)
Participate on SWENext Twitter	1 (4.0%)
Applied for a SWE Scholarship	1 (4.0%)

Note: The members may have participated in more than one activity, so percentages do not add up to 100%.

We asked members what they liked most about SWENext. Nearly one-third (32%) of SWENext members reported they liked the sense of community, support for females, and meeting other girls with the same interests. They reported:

- *It allows me to meet other engineering girls and gain wisdom from SWE engineers.*
- *I love the community inspiring girls into STEM.*
- *[I like] the support for females.*
- *I like how I can work with others any age doing what I love.*

In addition, nearly another third (32%) reported that they liked the SWENext events and opportunities related to engineering. They reported:

- *[I like] the workshops with SWE mentors and the Career Fair.*
- *I love the fact that SWENext has several opportunities to inspire young women to go into the STEM field.*
- *I love the community and the opportunities I can take part in, like the conference and scholarships.*
- *SWENext provides opportunities and encourages us to do engineering.*
- *I like that it has a lot of opportunities within it.*

Other aspects of SWENext that members appreciated were the engineering activities (16%) and the ability to network with other girls and the SWE mentors (12%). Members reported:

- *[I like] building contacts, networking, and talking with other girls about engineering.*
- *[I like] connecting and networking with other girls like me.*
- *[I like] getting to participate in STEM outreach activities and encouraging girls to pursue engineering.*

- *I like the hands-on activities involved.*

Finally, we asked SWENext members for suggestions on ways to improve SWENext. Thirty-eight percent of members suggested additional outreach by the way of more conferences, activities, and local gatherings of SWENext chapters. They reported that SWENext needs:

- *Local gatherings of just SWE Next girls with a few volunteers from local SWE sections.*
- *More experiments. Teen Expo.*
- *More conferences.*
- *More opportunities throughout the year.*
- *[To] increase the word about it. Many people don't know this exists and there is a limited presence in my community. Also, [need] a more active Facebook group.*
- *A better connection among SWE Next chapters. I have no idea if there are other chapters around here or communication with other chapters.*
- *More advertising of SWE. Also, more diversity of races and show that SWE is open to everyone (mostly female though).*
- *[To] continue having STEM outreach opportunities.*

Other suggestions included more ethnic diversity of members (14%) as well as more information regarding engineering disciplines and career paths (10%).

Appendix A: Schedules of Events and Activities

The Society of Women Engineers Presents

Invent it. Build it.

**SATURDAY
10.28.17**
Austin
Convention Center
in Austin

Outreach Event

Register today at ibi2017.eventbrite.com

**SWE
Girls Program
9AM - 3:30PM**



girls in
grades **6-8**

Participate in hands-on
Design Squad activities
with members of SWE
and have exclusive
access to the EXPO.

COST: \$7.00

*Registration is required.
Lunch and t-shirt provided.*

**SWE
Girls Program
9AM - 3:30PM**



girls in
grades **9-12**

Connect with real engineers
from all over the world to
learn about what they do
and how to be successful,
receive tips on selecting
the right college, make new
friends and more!

COST: \$7.00

*Registration is required.
Lunch and t-shirt provided.*

**Parent Education
Program (PEP)
9AM - 3:30PM**



**parents
& educators**

Learn about engineering
careers, scholarships,
college admission and
other helpful resources.
Parents also have
exclusive access to
the EXPO.

COST: \$5.00

*Registration is required.
Lunch and t-shirt provided.*



View our
Invent It. Build It.
videos on SWE's
YouTube channel.

A Collaborative Event By

girl scouts 

techbridge
inspire a girl to change the world.

ExxonMobil

DESIGNsquad
Global

swe 



**SATURDAY
10.28.17**
Austin
Convention Center
in Austin

Invent it. Build it.



EXPO
11:15AM - 2PM
come and go as you please/open house



Austin Convention Center
500 E Cesar Chavez St, Austin, TX

Not able to attend SWE Girls or Parent Educator Programs? Register for FREE and join us at the IBI EXPO. Exhibitors will share information about engineering clubs, camps, after-school programs, competitions, best practices, outreach grants and more. There will be hands-on activities and lots of fun!

WE conference attendees do not need a ticket to attend the Invent it. Build it. EXPO.



Get More Information

Visit inventitbuildit.swe.org or email inventitbuildit@swe.org

Invent it. Build it.

is made possible through a generous grant from The ExxonMobil Foundation.



MAKE A WORLD OF DIFFERENCE

#BETHATENGINEER

Get ready to learn what engineers do, the positive impact they have on people everywhere and how they make a world of difference.



Appendix B: Activity Sheets

SEISMIC SHAKE-UP!

CHALLENGE SHEET

DESIGN squad[®]
Global

YOUR CHALLENGE

Design a structure that can survive an earthquake—then put it to the test!



FOR MORE GREAT ACTIVITIES:
PBSKIDS.ORG/DESIGNSQUAD

DEFINE THE NEED

Hundreds of millions of people live in places around the world where earthquakes are common. Most of the destruction earthquakes cause is the result of collapsing structures, like skyscrapers, hospitals, and bridges. That's why earthquake engineering is so important. By designing buildings and other structures that can withstand the violent shaking of an earthquake, engineers save lives.



About 90% of all earthquakes take place along the Ring of Fire—a zone stretching around the rim of the Pacific Ocean.

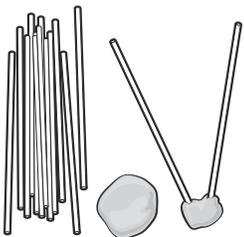
MATERIALS

Structure (per person)

- 20–30 wooden or plastic coffee stirrers (5–6 in long, or about 14 cm)
- ¼ lb (100+ grams) modeling clay (about half the size of a fist); non-hardening Plasticine[®] preferred
- manila file folder or thin piece of cardboard (8½ x 11 in or A4), as the base of your structure
- ruler

Shake Table

- 2 pieces sturdy cardboard (about 8½ x 11 in or A4)
- 2 thick rubber bands
- 2 tennis balls
- 2 large binder clips
- ruler or paint stirrer to make a handle
- masking tape



BRAINSTORM & DESIGN

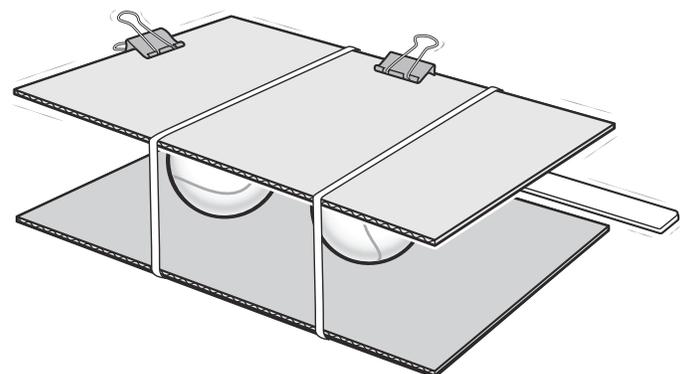
Using coffee stirrers and clay, can you design a structure that's stable and sturdy enough to survive an earthquake's vibrations? It must be **at least 8 inches tall**. Sketch your ideas on a piece of paper.

BUILD

Build your structure directly on top of the file folder, fixing the base of it to the surface of the folder. Use the ruler to make sure it's the minimum height.

Build a shake table, which is a device engineers use to simulate the back-and-forth shaking of an earthquake.

1. Wrap the rubber bands around the width of both pieces of cardboard. Space them about 4 inches apart.



2. Slide the two tennis balls in between the pieces of cardboard, and position them underneath each rubber band.
3. Tape the ruler (or paint stirrer) under the top piece of cardboard to make a handle.

TEST, EVALUATE, & REDESIGN

- Test your structure using the shake table. Attach the file folder with your structure on top of it to the table with the binder clips.
- Use one hand to hold the bottom of the shake table against a surface, pull the handle with the other, and let go! Earthquake!
- How did your structure hold up during the seismic shake-up? If it wobbled, swayed, tipped over, or collapsed, it's time to redesign. You want your structure to be as strong and stable as possible.
- Success? Take it to the next level and build an even taller structure!

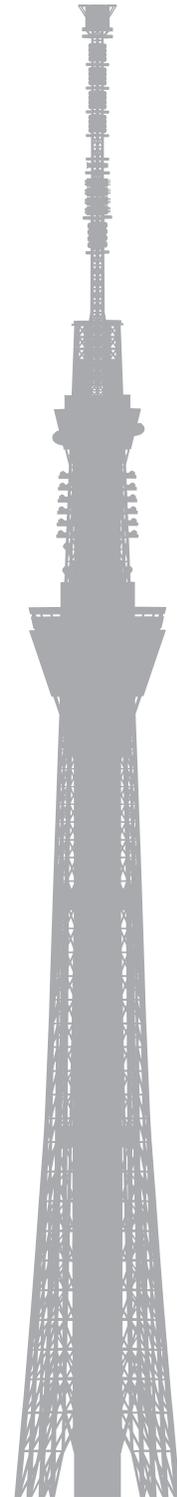
Problem-Solving Tips

WHAT IF YOUR STRUCTURE . . .

- **tips over?** Maybe your base is too small. Make it wider and sturdier.
- **collapses?** Add triangular shapes. Triangles are stronger than squares or rectangles because all three sides of a triangle carry some of the load (weight).
- **wobbles?** Try cross-braces. Turn squares into triangles by adding diagonal supports that go from one corner of the square to the other.

ENGINEERING AND INVENTION IN ACTION

Tokyo Sky Tree is the tallest tower in the world (634 m; 2,080 ft). It's also located right in the heart of an earthquake zone. So its engineers and architects needed to build a tower with the latest anti-earthquake technology. One way they did this was by standing the tower on a triangular, pyramid-shaped base. Another was by including massive dampers—shock absorbers that cushion the building during an earthquake. In March 2011, while still under construction, the tower was put to the test when a tremendous 9.0-magnitude earthquake struck Tokyo. Sky Tree's earthquake-resistant features worked beautifully—there was no structural damage and none of the construction workers caught in the building during the quake were injured.



Tokyo Sky Tree



DESIGN SQUAD GLOBAL is produced
by WGBH Boston

MAJOR FUNDING



PROJECT FUNDING

the Lemelson foundation
improving lives through invention

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HELPING HAND



YOUR CHALLENGE

Design and build a device that lets you grab different objects and drop them into a container that's at least two feet away from you.

BRAINSTORM & DESIGN

Look at your materials and think about the questions below. Then sketch your ideas on a piece of paper or in your design notebook.

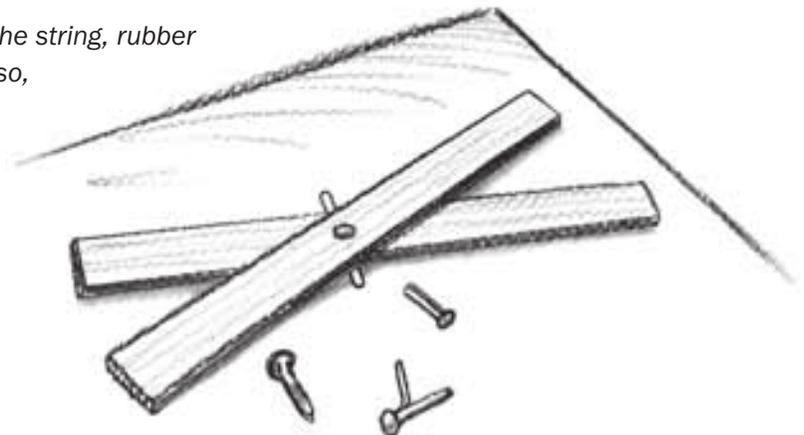


1. Using these materials, what can you build to grab objects that are two feet away from you?
2. How will your grabbing device open and close so it can grip an object and let it go?
3. How will you attach your grabber to the end of the stick?
4. How will you control your grabber when it's at the end of the stick?

BUILD, TEST, EVALUATE & REDESIGN

Use the materials to build your grabber. Then test it by trying to pick up different objects. When you test, your design may not work as planned. When engineers solve a problem, their first solution is rarely their best. Instead, they try different ideas, learn from mistakes, and try again. Study the problems and then redesign. For example, if your grabber's jaws:

- have a weak grip—*Increase their force. Each arm of the jaw is a **lever**—a bar that pivots around a **fulcrum**. In this case, the fulcrum is the brass fastener. Change the strength of your jaw's grip by adjusting the length of the arms and the fulcrum's position. (See illustration.)*
- keep dropping things—*Make sure that the jaws close enough to actually hold something. Also see if the jaw's gripping surface is big enough and shaped right to have a firm grip.*
- bend or twist—*Reinforce them with something stiff. Also, check if the jaw's arms are longer than necessary—short arms don't bend as easily as long ones.*
- don't work at the end of the stick—*Make sure the string, rubber bands, and moving parts aren't getting stuck. Also, move the jaws with your hands. If they don't work the way they should, readjust the parts.*



as built on TV™
pbs.org/designsquad

MATERIALS (per person)

- 4 brass fasteners
- corrugated cardboard
- hole punch
- objects to pick up (e.g., tennis balls, cotton balls, plastic soda bottles, and paper cups)
- 2 rubber bands
- sandpaper
- scissors
- string
- tape (duct or masking)
- 4 toothpicks
- 4 wooden skewers
- yardstick (or long paint stirrers for 5-gallon buckets, a thin wooden slat, or lath 2–3 feet long)

TAKE IT TO THE NEXT LEVEL

- Supersize me! Build a grabber that can pick up two objects at once.
- Smooth moves! Add a second motion to your grabber, such as making the stick that holds the jaws able to bend like an elbow or extend another two feet and then retract.

MAKE IT ONLINE

Blast me a marshmallow, would ya?

Build an air-powered marshmallow launcher out of plastic pipe and marshmallows. See how on Make Magazine's project page at makezine.com/designsquad.

ENGINEERING IN ACTION

There's something unique about four-year-old Michael—he has four hands! Born with six inches of his left arm missing, Michael wears a standard prosthetic (i.e., artificial) hand. It has some limitations—Michael can pick up and hold things but can't squeeze or press very hard. Michael's father wanted him to be able to do more with his prosthetic hand and have some fun in the process. With this in mind, he contacted engineers at the Open Prosthetics Project. Together, they built Michael two more hands—hands unlike any you've seen! One is a dinosaur puppet. Michael grips things by controlling its jaws. The other is a fishing rod. Michael uses it to catch fish as well as to reel in stray toys. Michael's father continues to think up and build more hands for Michael. "Once you have the training," he says, "you can conceive, design, and build whatever your imagination pictures."



Watch the **DESIGN SQUAD** Water Dancing episode on PBS or online at pbs.org/designsquad.



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Appendix C: Survey Instruments

Invent It. Build It. – Student Feedback Form

Thank you for your participation. Please take a few minutes to fill out this survey.

Your comments and ideas will help make this event better in the future.

If you have questions, please ask a volunteer.

1. What grade would you give today’s event? Please circle the letter to show your answer.

A	B	C	D	F
----------	----------	----------	----------	----------

2. What did you like most about the event today? What else did you like?

3. Please circle a number by each statement to indicate how much you agree with the statement about today’s event.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Before this event, I knew what an engineer did.	1	2	3	4	5
After this event, I know what an engineer does.	1	2	3	4	5
Before this event, I was interested in becoming an engineer.	1	2	3	4	5
After this event, I am interested in becoming an engineer.	1	2	3	4	5
I see a connection between my interests/passions and a career in engineering or technology.	1	2	3	4	5
I enjoyed the fact that this was an event for girls.	1	2	3	4	5
I know how to find out more about engineering and technology if I want to.	1	2	3	4	5
I know my friends would support my interest in engineering or technology.	1	2	3	4	5
My family supports my interest in engineering or technology.	1	2	3	4	5

4. Please circle a number by each statement to indicate how much you agree with the statement about today's event.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
My confidence in problem solving improved.	1	2	3	4	5
My ability to think of different ways to solve a problem improved.	1	2	3	4	5
My confidence in designing things improved.	1	2	3	4	5
My confidence in building things improved.	1	2	3	4	5
The role models I worked with listened actively to my ideas.	1	2	3	4	5
The role models provided support and encouragement.	1	2	3	4	5
The role models were approachable.	1	2	3	4	5
The role models guided me during the activities.	1	2	3	4	5
The role models inspired me to consider a career in engineering or technology.	1	2	3	4	5

5. Please circle a number by each statement to indicate how much you agree with the statement.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Engineers are creative.	1	2	3	4	5
Engineers do work that is hands-on.	1	2	3	4	5
Engineers do work that is fun.	1	2	3	4	5
Engineers do work that allows them to help their community and/or society.	1	2	3	4	5
Engineers work in many different kinds of career fields.	1	2	3	4	5
Engineering and technology are good career choices for women.	1	2	3	4	5

6. If you were in charge, how would you change this event?

7. Would you recommend that other kids participate in events like this?
- a. Yes
 - b. Maybe
 - c. No (please explain): _____
8. What grade are you in? _____
9. Are you a member of SWENext? a. Yes b. No
10. Are you a member of a SWENext Club? a. Yes b. No
11. With what races or ethnicities do you most identify? (Choose all that apply.)
- a. White or European American
 - b. Hispanic, Latino, or Spanish
 - c. Black or African-American
 - d. Asian American
 - e. Native Hawaiian or Pacific Islander
 - f. Native American or Alaskan Native
 - g. Other: _____
 - h. Prefer not to answer
12. Are you more interested in being involved with the Girl Scouts after attending this event?
- a. Yes
 - b. No
 - c. Maybe
 - d. I am already a Girl Scout
13. How many DIFFERENT trading cards did you collect from sashed role models during the Expo?
- a. None b. 1-5 c. 6-10 d. > 10
14. Which was your favorite demonstration from the sashed role models during the Expo?
Leave blank if you did not view any demonstrations or did not have a favorite.
- _____
- _____

Thanks very much for your help! Please hand in your completed survey.

Invent It. Build It. – High School Student Feedback Form

Thank you for your participation. Please take a few minutes to fill out this survey.

Your comments and ideas will help make this event better in the future.

1. What grade would you give today's event? Please circle the letter to show your answer.

A	B	C	D	F
----------	----------	----------	----------	----------

2. What did you like most about the event today? What else did you like?

3. Please circle a number by each statement to indicate how much you agree with the statement.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
I see a connection between my interests/passions and a career in engineering or technology.	1	2	3	4	5
I know how to find out more about engineering and technology if I want to.	1	2	3	4	5
I know my friends would support my interest in engineering or technology	1	2	3	4	5
My family supports my interest in engineering or technology.	1	2	3	4	5
The role models inspired me to consider a career in engineering or technology.	1	2	3	4	5

4. If you were in charge, how would you change this event for the future?

5. Would you recommend that other students participate in events like this?

a. Yes

b. Maybe

c. No (please explain): _____

6. Please rate each segment of today's event by circling a letter grade. Add any comments you have.

EXPO	A	B	C	D	F
-------------	----------	----------	----------	----------	----------

Comments: _____

Shock Absorber Activity (Ariel Biggs)	A	B	C	D	F
--	----------	----------	----------	----------	----------

Comments: _____

7. What grade are you in? _____

8. Are you a member of SWENext? a. Yes b. No

9. Are you a member of SWENext Club? a. Yes b. No

10. With what races or ethnicities do you most identify? (Choose all that apply.)

- a. White or European American
- b. Hispanic, Latino, or Spanish
- c. Black or African-American
- d. Asian American
- e. Native Hawaiian or Pacific Islander
- f. Native American or Alaskan Native
- g. Other: _____
- h. Prefer not to answer

11. How many DIFFERENT trading cards did you collect from sashed role models during the Expo?

- a. None
- b. 1-5
- c. 6-10
- d. > 10

12. Which was your favorite demonstration from the sashed role models during the Expo? Leave blank if you did not view any demonstrations or did not have a favorite.

Thanks very much for your help! Please hand in your completed survey.

Invent It. Build It. – Adult Participant Feedback Form

Thank you for your participation. Please take a few minutes to fill out this survey.

Your comments and ideas will help make this event better in the future.

1. What grade would you give today’s event? Please circle the letter to show your answer.

A	B	C	D	F
----------	----------	----------	----------	----------

2. What did you like most about the event today? What else did you like?

3. Please circle a number by each statement to indicate how much you agree with the statement.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
This event helped me feel well-equipped to talk with girls/my daughter about a career in engineering.	1	2	3	4	5
This event helped me understand what engineers do.	1	2	3	4	5
This event helped me understand why engineering is a good career choice.	1	2	3	4	5
This event helped me understand what it takes to become an engineer.	1	2	3	4	5
This event helped me understand why there are so few women in engineering.	1	2	3	4	5
This event taught me some activities I can do with girls/my daughter.	1	2	3	4	5
This event helped me learn where to find resources for girls/my daughter.	1	2	3	4	5
I had a chance to meet professional engineers today.	1	2	3	4	5
All my questions were answered today.	1	2	3	4	5
My goals were met today.	1	2	3	4	5
I feel empowered to help girls/my daughter become an engineer someday if they want to.	1	2	3	4	5
I had fun today.	1	2	3	4	5

4. What did you learn that you didn’t know before today’s event?

5. How would you change this event for the future?

6. Please rate each segment of today's event by circling a letter grade. Add any comments you have.

EXPO	A	B	C	D	F	Did not attend
-------------	---	---	---	---	---	----------------

Comments: _____

Panel Discussion 1: Why Engineering?	A	B	C	D	F	Did not attend
---	---	---	---	---	---	----------------

Comments: _____

Panel Discussion 2: Preparing for Engineering Success with Heather Mayes	A	B	C	D	F	Did not attend
---	---	---	---	---	---	----------------

--OR--

Panel Discussion 2: SWENext: Building the Next Generation of Engineers with Debra Kimberling	A	B	C	D	F	Did not attend
---	---	---	---	---	---	----------------

Comments: _____

Safe Landing Hands-on Activity	A	B	C	D	F	Did not attend
---	---	---	---	---	---	----------------

Comments: _____

7. Would you recommend that others participate in events like this?

- a. Yes
- b. Maybe
- c. No (please explain): _____

8. What is your relationship to the girl(s) participating in the event today? (Choose all that apply.)

- a. Mother
- b. Father
- c. Guardian
- d. Troop Leader
- e. Teacher
- f. Other _____

9. With what races or ethnicities do you most identify? (Choose all that apply.)
- a. White or European American
 - b. Hispanic, Latino, or Spanish
 - c. Black or African-American
 - d. Asian American
 - e. Native Hawaiian or Pacific Islander
 - f. Native American or Alaskan Native
 - g. Other: _____
 - h. Prefer not to answer
10. Are you an engineer or do you have an engineering degree?
- a. Yes
 - b. No
11. Are you in the education field, such as a counselor, administrator, or teacher? Please indicate the level of students you work with. (Choose all that apply.)
- a. Pre-K
 - b. Elementary
 - c. Middle School
 - d. High School
 - e. College
 - f. Other _____
 - g. I am not in the education field
12. How are you affiliated with SWE? (Choose all that apply.)
- a. SWE Collegiate or Professional Member
 - b. K-12 Educator Member
 - c. Parent/Guardian of SWENext Member
 - d. SWENext Club Advisor
 - e. Other _____
 - f. Not Affiliated
13. How many DIFFERENT trading cards did you collect from sashed role models during the Expo?
- a. None
 - b. 1-5
 - c. 6-10
 - d. > 10
14. Which was your favorite demonstration from the sashed role models during the Expo? Leave blank if you did not view any demonstrations or did not have a favorite.

Thanks very much for your help!
Please hand in your completed survey. Stay in touch with SWE at www.swe.org.

SWENext Feedback Form

Please fill out this survey to help us improve SWENext.

1. How long have you been a member of SWENext?
 - a. 6 months or less
 - b. 1 year or less
 - c. 2 years or less
 - d. 3 years or less
 - e. More than 3 years

2. Please select up to 3 reasons you are a member of SWENext today.
 - a. I want to learn more about engineering.
 - b. I joined SWENext because I am also a member of Girls Scouts, a FIRST Robotics team, or other organization.
 - c. I would like to participate in fun activities about engineering.
 - d. I would like to be with my friends.
 - e. I joined SWENext at Invent It Build It, Design Lab, or other engineering outreach event.
 - f. My parent or teacher encouraged me to join SWENext.
 - g. I would like to be part of the Society of Women Engineers community.
 - h. Other: _____

3. What SWE-related activities have you been a part of in the past 12 months? (Choose all that apply)
 - a. I attended SWE Invent It Build It.
 - b. I attended a SWENext Design Lab.
 - c. I attended a local SWE Engineering Outreach Event: _____
 - d. I won a SWENext Innovator Award.
 - e. I won a SWENext High School Community Award.
 - f. I am a member of a SWENext Club.
 - g. I applied for a SWE Scholarship.
 - h. I read the SWENext Newsletter.
 - i. I read SWEet Wisdom.
 - j. I participate on the SWENext Facebook Group.
 - k. I participate on SWENext Twitter.
 - l. I read articles on the SWE All Together Blog.
 - m. Other: _____

4. What do you like most about SWENext?

5. Please help us improve SWENext. What would you suggest?

Thanks very much for your help! Please hand in your completed survey.

Invent It. Build It. – EXPO Exhibitor Feedback Form

Thank you for your participation. Please take a few minutes to fill out this survey.

Your comments and ideas will help make this event better in the future.

1. What grade would you give **the EXPO**? Please circle the letter to show your answer.

A	B	C	D	F
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2. What did you like most about the EXPO? What else did you like?

3. How would you change the EXPO for the future?

4. Please tell us how much you agree with the following statements about today’s event. Please check the box to show your answer.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	Not Applicable
Exhibitor registration went smoothly.						
The fee for exhibitor registration was reasonable.						
The on-site check in process was helpful to us.						
The set-up and tear-down of the booth went smoothly.						
We would be interested in exhibiting at other SWE Conferences, local or national.						
SWE’s IIBI EXPO compares favorably with others where we have exhibited.						
Our booth received enough interest and foot traffic.						
We enjoyed the fact that this was an event for girls.						
We enjoyed interacting with the adults and children who visited our booth.						

Thank you very much for your help!